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TP 1624

Marine Casualty Investigations

Enquêtes sur les accidents maritimes

Investigation Report to the Minister pursuant to sections 542 or 545 of the Canada Shipping Act

Rapport d'investigation au Ministre conformément aux articles 542 ou 545 de la Loi sur la marine marchande du Canada

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REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES ATTENDING THE VEERING OUT OF THE CHANNEL AND SUBSEQUENT FOULING OF TWO CHANNEL BUOYS BY THE "GENERAL CABAL" IN LAKE ST. FRANCIS, ST. LAWRENCE RIVER ON JUNE 18, 1986.

REPORT No. 448

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INVESTIGATION REPORT INTO THE CIRCUMSTANCES ATTENDING THE VEERING OUT OF THE CHANNEL AND SUBSEQUENT FOULING OF TWO CHANNEL BUOYS BY THE PHILIPPINE MOTOR VESSEL "GENERAL CABAL" IN LAKE ST. FRANCOIS, ST. LAWRENCE RIVER, ON JUNE 18, 1986.

Particulars of Vessel

Name	"GENERAL CABAL" ex "BRUNI"
Official Number	228246
Port of Registry	Manila, Philippines
Call Sign	DZAB
Gross Tonnage	7,952.92
Net Tonnage	4,999.45
Length	145.87 m
Breadth	19.64 m
Depth	9.37 m
Draught (at time of incident)	7.77 m forward 7.90 m aft
Type	General Cargo
Built	1976, G.m.b.H. & Co., KG-Kiel, steel construction
Propulsion	one MAK Maschinenbau, 4SA, 9 cylinder diesel engine of 6,000 b.h.p., driving a fixed pitch propeller, 15.5 knots
Cargo	Coal
Crew	22
Owners	Aboitiz Jebsen Makati, Philippines
Local Agent	Braemar Shipping Ltd. Montreal, Quebec

Navigating Equipment

Radar (1)	Decca RM 926
Radar (2)	Decca RM 916 A
Direction Finder	ITT Marine, ADF 2200
Echo Sounder	Atlas-Echograph 460
Decca	Kong Sberg, MK21
Sat-Nav	Navidyne, ESZ-4000
Gyro Compass	Anschutz-Kiel (repeater on each wing)
Magnetic Compass	Bergen-Nautic, reflecting
Speed Log	Sagem
Emergency W/T Receiver	Delcom Elektro,, type DC 300
VHF	two (2) radios (very high frequency)
SSB	one (1) radio (single side band)

Description of Vessel

The "GENERAL CABAL" is a 3-hold general cargo vessel. The navigating bridge, the engine-room and the accommodation are situated aft.

The vessel was in possession of valid Philippine Ship Construction and Safety Equipment certificates.

NOTE: All times in this report are expressed in Eastern Daylight Saving Time. (UTC minus 4 hours).

Background

The "GENERAL CABAL" departed Toledo, Ohio with a load of coal bound for Europe.

While proceeding down the Seaway, as normal, the pilots changed at Snell lock, and the pilot newly aboard took the

conduct of the vessel.

Subsequent to an order given for a course alteration, the vessel veered uncontrollably to starboard, struck a port hand buoy and fouled her propeller. The vessel then veered to port, fouled another buoy and dragged the two buoys downstream before anchoring.

Later in the day the buoys were recovered and repositioned by a buoy tender. The vessel's steering equipment was repaired and tested prior to her being given a clearance to sail by a Seaway Inspector. Damage was minimal but there was a risk of collision at the time of the incident.

Narrative

The "GENERAL CABAL" departed Toledo, Ohio on June 15, 1986, with a crew of 22 on board. She was bound for Salten, Norway with a cargo of 10,230 tonnes of coal. The departure draught was 7.923 m forward and aft.

The vessel sailed across Lake Erie, down the Welland Canal and then across Lake Ontario before entering the St. Lawrence Seaway. The trip was uneventful. At Snell lock a relief pilot boarded and at 2300 on June 17, 1986, the "GENERAL CABAL" cleared the lock.

By 2314, the engine was rung to 'full ahead'. On approaching the Seaway International Bridge, the engine revolutions were reduced to 'half ahead'. To comply with the speed limit restrictions from Snell lock to buoy D49, the engine telegraph was rung to 'full ahead' but the main engine revolutions were reduced to maintain a speed through the water of about 9 knots.

At 0037, June 18, 1986, the vessel was logged to be abeam of Butternut Island at buoy D52. The "GENERAL CABAL" was now heading on a course of 027½ (T). Nearing buoy D49, the quartermaster (QM) was ordered by the pilot to apply 10° starboard rudder in order to begin a turn for the upcoming course of 049°(T) on Lancaster Bar. This was promptly executed by the QM who continuously checked the rudder indicator situated in front of him on the deckhead.

The rudder angle increased from 0° to 10° to starboard but at 10° it refused to stop and continued increasing until it reached hard over to starboard. The vessel's head started to swing to starboard and the swing accelerated. The order hard-a-port was given to the QM who apparently tried to execute the order but the vessel continued a rapid starboard

swing.

It was 0040 when the second officer, who was the officer on watch (OOW), and the pilot noticed that the QM was having difficulty with the steering control lever. The former immediately took over the steering but his attempt at reducing starboard rudder proved to be to no avail. The master was then called. The OOW rang the engine to be stopped on orders from the pilot. Meanwhile the master arrived in the wheel-house and after being told of the situation, promptly switched to the back-up steering mechanism.

The back-up steering mechanism rendered the rudder and steering gear operational once again. By this time, the ship was almost perpendicular to the channel, the bow being outside the channel. At 0041, the engine was rung to 'full astern' to keep the bow away from shallow water.

At 0040, the upbound vessel "KRAIGHER B" had settled on the Lancaster Bar course of 229°(T). Midway between buoys D42 and D44, the OOW caught sight of the downbound vessel's red side light. He asked the pilot what the nature of the manoeuvre was. The pilot immediately called the "GENERAL CABAL" on VHF radio and was told that the vessel had a temporary loss of steering. He then called for the master and had the engine revolutions rung progressively to slower speeds until at 0044 the engines were rung to 'dead slow ahead'.

Communications followed between the two vessels on how the meeting should take place at the bend in the channel. At approximately 0050, the "KRAIGHER B" steered around the stern of the "GENERAL CABAL".

After the veering out of the channel by the "GENERAL CABAL", several engine manoeuvres were performed in order to keep the vessel away from shallow water and to provide sufficient room to let the upbound vessel pass safely. Nevertheless the "GENERAL CABAL" drifted into buoy D47 due to a westerly wind and a northeasterly current. The green buoy slid along the port side of the hull until it reached the stern, wedging itself between the propeller and the rudder. At 0051 various attempts were made to restart the main engine but were unsuccessful. It was later discovered that the buoy had fouled the propeller and was preventing the engine from turning over.

After the "KRAIGHER B" had sailed by, the master and pilot realized that buoy D47 could not be found, thus two shackles of the starboard anchor were let go. The "GENERAL

CABAL" swung round her anchor and then dragged the anchor downstream together with the green buoy D47 and subsequently the red buoy D46. The vessel's anchor finally took hold on the north side of Lancaster Bar channel, at an emergency anchorage, in position 45°06.9'N 074°28.1'W. By early morning, soundings of the tanks and the water surrounding the ship had assured the master that the vessel was not taking on any water and that she was not aground. At 1620, the Canadian Coast Guard Ship (CCGS) "SIMCOE", a buoy tender, arrived on the scene, cleared and picked up the buoys and repositioned them.

A damage inspection by the divers revealed that the propeller had been chipped but that the rudder appeared to be undamaged. A thorough check of the steering gear and steering mechanism was carried out after the repairs were completed. The main propeller tachometer was found to be out of order so a Seaway Inspector instructed the "GENERAL CABAL" to proceed upriver to Grass Islet anchorage.

The vessel remained anchored while the tachometer was being repaired and further tests were then carried out. At 2144 the "GENERAL CABAL" was granted clearance to sail by the Seaway Inspector. For the remainder of the voyage steering control lever No. 2 became the primary means of steering and No. 1 was left as a back-up system.

Analysis

1. Steering gear

The vessel is equipped with an hydroelectrically operated steering system. The rudder is activated by a rotary-vane apparatus manufactured by Frydenco Hydra Pilot in 1976. The system may be operated in the automatic, hand-electric or remote control mode. At the time of the incident, the two pumps feeding the apparatus were operating and the helm was steered in the hand electric mode.

The response to this system is quite fast and tests carried out after the incident revealed that it took 15 seconds to go from full port to full starboard rudder.

2. Steering control system

At the steering station there are two steering controls located close to one another in the centre of the wheelhouse. Each steering control has a steering control lever replacing the familiar steering wheel. The

selection of steering control is made possible by the turn of a switch on the steering control board on the main console.

At the base of each steering control lever there are two (2) electrical switches, one to the left, the other to the right. Between each switch and the bottom end of the steering control lever is a spring. If the steering control lever is moved to the right, the left spring is compressed and the left switch closes. It is from these switches that the steering gear is activated. When pressure is released from the steering control lever, the spring returns the steering control lever to its upright center position. These two (2) steering control mechanisms found on board are manufactured by Anschutz, Kiel.

The ship is steered to port or starboard by moving the steering control lever to the left or to the right. The rudder moves in the direction requested as long as the QM holds the steering control lever to the right or to the left. Although the steering control lever is spring loaded and pressure is released as tension is removed from the steering control lever, the rudder will remain at the angle to which it was hydraulically moved. The rudder will not return to its original position until tension is applied to the steering control lever in the opposite direction. Similarly, the rudder angle will in time assume maximum angle if tension is maintained on the steering control lever. Such an arrangement is commonly known as a 'non-proportional' system. No other 'proportional' system, electrical or hydraulic, is fitted to the vessel.

The steering gear and steering control lever mechanism had been found to be satisfactory and no indications of malfunction were noticed by either the engine crew or the deck crew during the first two days of the voyage from Toledo.

When the OOW realized that the QM was having difficulty with the No. 1 steering control lever he immediately took over at the steering position. As soon as it became evident that rudder helm could not be reduced and that the No. 1 steering mechanism was malfunctioning, the OOW called the master, however, in the period prior to the master's arrival on the bridge, the OOW failed to switch to the No. 2 back-up steering mechanism. When the master arrived on the bridge, he switched to the No. 2 steering system and immediately restored the steering to the vessel.

It was later found that a spring in way of the left electrical switch had broken. There are no alarms in the bridge to indicate that the steering mechanism has failed.

An incident of similar nature whereby the vessel took an uncontrollable swing was reported in May 1981. At that time, the vessel was named the "BRUNI" and was downbound just south of the Quebec bridge. A faulty solenoid switch in the bridge console prevented proper helm correction after a hard-a-starboard rudder was applied. The result of that casualty was a grounding on the south shore 8 cables below the Quebec bridge.

3. Current

The pilot indicated that there were no anomalies with the current. It had a north-easterly set, a rate of 1.5 knots and tended to favour the red buoys.

Extracting from the Sailing Directions for the Great Lakes, volume I, ninth edition, 1982:

> The current across Lancaster Bar is reported to set fair with the channel at a rate of 1 knot or less.

4. Weather forecast and weather conditions

The marine forecast between Gananoque and Trois-Rivières issued by Environment Canada at 1630 Eastern Daylight Saving Time Tuesday June 17, 1986 and valid until midnight Wednesday was as follows:

> Small craft warning
> Winds westerly 15 to 25 knots tonight. They will reduce to 15 overnight and become 10 Wednesday. Mostly clear this evening and tonight. Wednesday sunny with cloudy periods. Visibility of 6 miles or more.
>
> (free translation)

The good visibility encountered by the "GENERAL CABAL" confirms the accuracy of the weather report.

5. Shipborne Navigational Aids

The pilot had not been on board this vessel before and was not advised of the steering system on board nor of the number of pumps in operation. Such advice did not seem necessary since both pumps were on and the steering

gear was responding quickly to the orders given. The pilot noticed that all navigating equipment in use performed satisfactorily until the steering failure.

The main engine can be controlled from the bridge or from the manual control station near the main engine. The remote control in the wheel-house had been out of order for some time. An electrician specializing in such systems was already aboard and trying to correct the problem. Meanwhile the telegraph on the bridge console was used to transmit orders to the engine-room.

6. Factors Affecting Speed

Between buoy D49, north of Butternut Island, and Snell lock, there is a maximum speed limit over the ground of 8.6 knots for upbound vessels and 10.4 knots for downbound vessels when normal water levels prevail. On leaving Snell lock, at 2300 June 17, the engine was rung to different speeds before being rung to 'half-ahead' on approaching the Seaway International Bridge. Since the "GENERAL CABAL" had not reached buoy D49, the telegraph was rung to 'full-ahead' but the main engine revolutions were reduced so that the vessel maintained a speed through the water of about 9 knots.

7. Repairs, Inspections and Tests

Following communications with Seaway Eisenhower a Canadian Seaway Inspector was dispatched to board the vessel since the "GENERAL CABAL" was anchored in Canadian waters.

At 0937 June 19, a Seaway Inspector boarded the "GENERAL CABAL" accompanied by a ship's agent, a representative of the underwriters and three divers. Following an initial inspection, the divers reported that the anchor chain of the green buoy was fouling the propeller. The Seaway Inspector confirmed to Seaway Eisenhower that buoys D46 and D47 were out of place but that the vessel did not block the channel.

The No. 1 steering control was temporarily repaired by a shore technician later in the day using non-standard material since spare parts were not available. The engine, steering gear and the steering controls were tested before departure from Lake St. Francis emergency anchorage. No. 2 steering mechanism became the primary source of steering and No. 1 steering mechanism was relegated to a backup role in the system. During these tests the propeller tachometer was found to be faulty,

and as a result of this the Seaway Inspector instructed the master to proceed to the Grass Islet anchorage to correct the malfunction.

The trip was uneventful. The vessel arrived at the anchorage at 2182 and anchored there. While she lay at anchor the engine, the steering gear and the steering mechanism were once again thoroughly tested and found satisfactory before clearance was granted to sail at 2216. Nothing untoward was observed during the remainder of the downbound voyage in the St. Lawrence River.

8. Suspension of Seaway Traffic

Following communication between the master of the "GENERAL CABAL" and Seaway Eisenhower, traffic was suspended at 0120 on June 18, 1986, until the position of buoys D46 and D47 could be assessed, and a survey of the ship could be made by the proper authorities. One-way traffic was resumed at 1045 when the Seaway Inspector confirmed that the south side of the channel was clear. At 2002 Seaway Eisenhower granted the "GENERAL CABAL" clearance to sail and two-way traffic was resumed once again.

9. Bridge Communication

Communications between the pilot and the bridge personnel were reported to be satisfactory. The pilot, making full use of his local knowledge, carried out his duties to the entire satisfaction of the master.

10. Qualifications and Experience of Personnel

The master of the "GENERAL CABAL" holds a Philippine master mariner's certificate issued in 1980. He has been at sea for 18 years including 3 months as master of this vessel. He has been a master since 1982.

The second officer holds a Philippine chief officer's certificate issued in 1981. He has been at sea for 12 years.

The pilot holds a Canadian First Mate Inland Waters certificate of competency issued in 1951. After 30 years at sea serving in various ranks, he was issued a pilot's licence by the Great Lakes Pilotage Authority in 1972.

Findings

The "GENERAL CABAL" sheered to starboard and fouled two channel buoys before anchoring on Lancaster Bar due to a failure in the switch (on/off contacts) in the bridge steering control unit.

It would appear that the control of the vessel was lost due to the following:

- the control unit switch was not of a fail-safe design;
- the spring, designed to break the electrical contact, broke, thereby allowing a continuous supply of power to the steering gear, resulting in a continued application of starboard helm;
- the resulting hard-a-starboard helm was excessive for the minor course alteration required; and
- the failure to switch immediately to the back-up steering control.

Other Findings

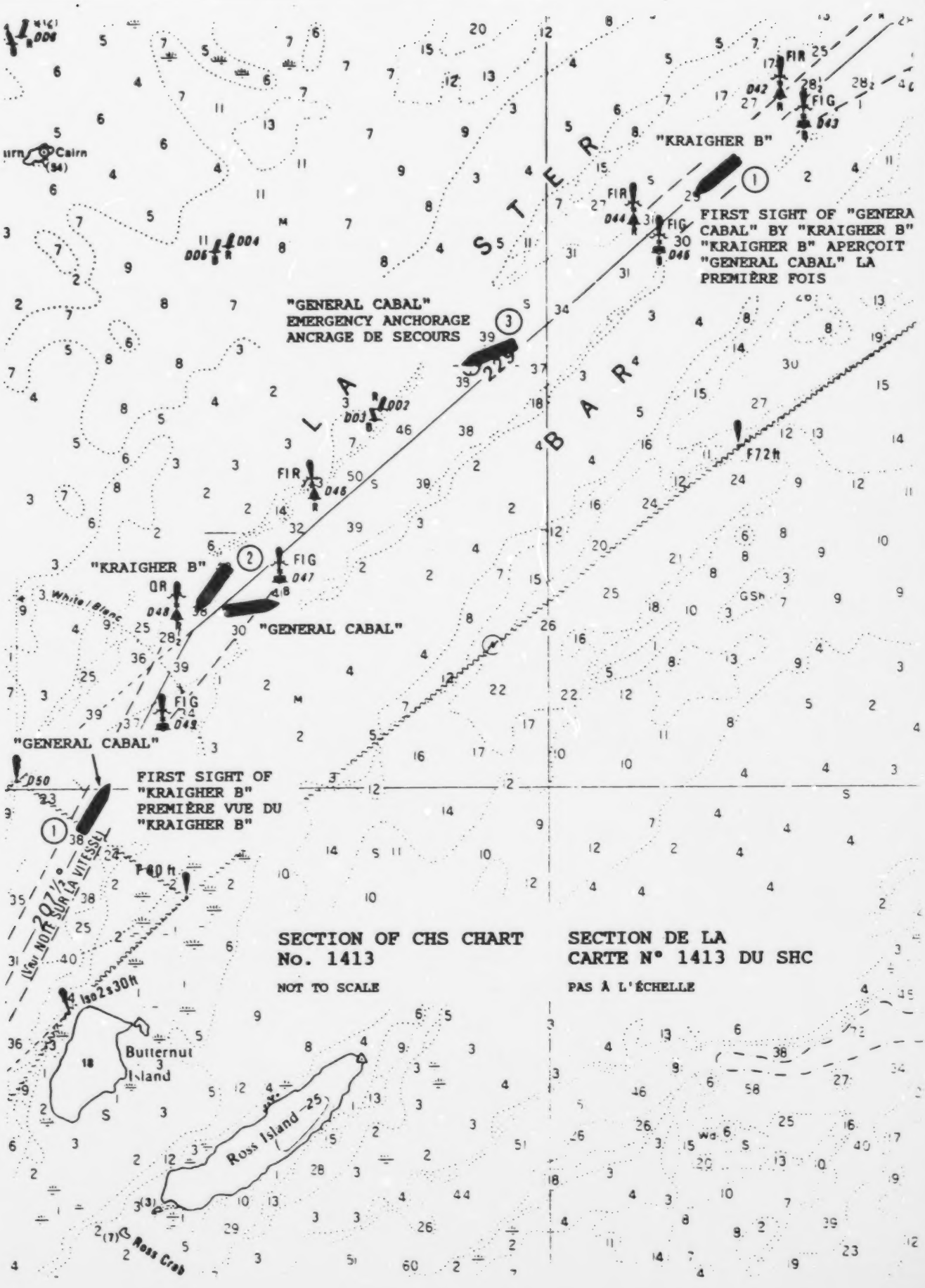
The steering mechanism problem in May 1981 had been rectified and did not contribute to the incident.

The manning of the bridge by the pilot, experienced OOW and helmsman was satisfactory for the conditions which existed at the time of the incident.

The alertness of the pilot and the master on the "GENERAL CABAL" and of the pilot and OOW on the "KRAIGHER B" prevented a more serious casualty. Their actions were seamanlike and proper.

An established drill for changing over from the primary steering mechanism to the back-up steering mechanism was not sufficiently practiced nor was its importance emphasized by the master.

OTTAWA, ONTARIO
NOVEMBER, 1986.



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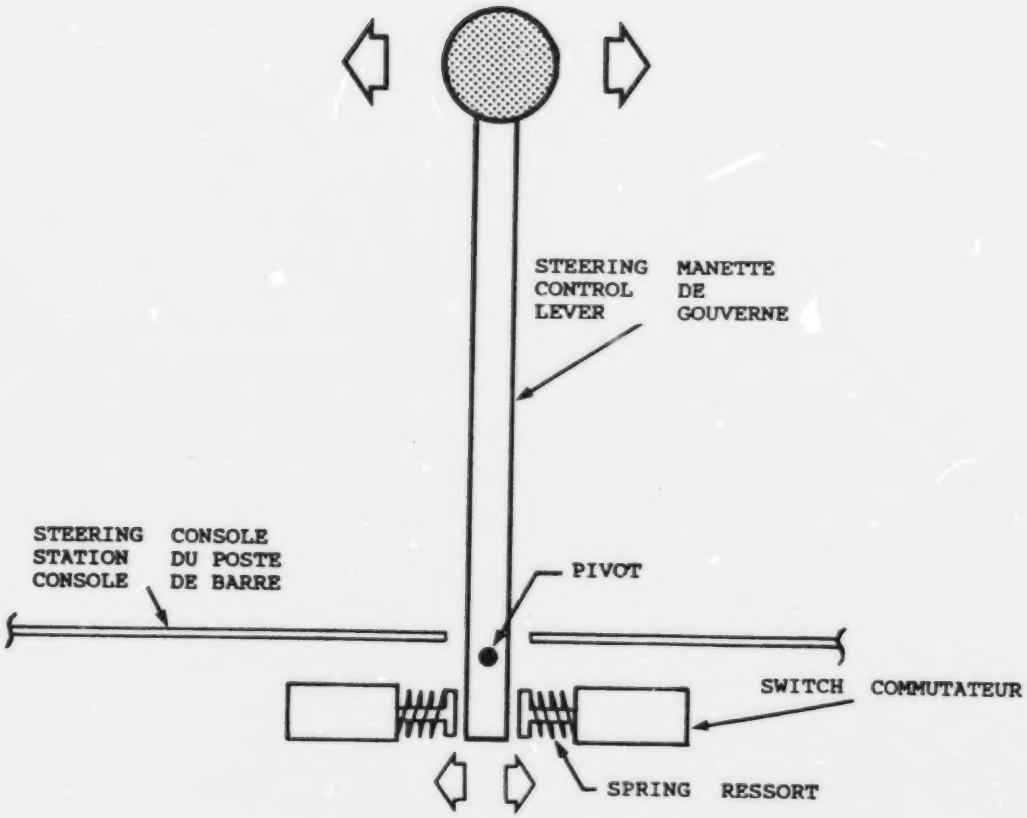

SKETCH OF STEERING LEVER MECHANISM

CROQUIS DU MECANISME DE LA MANETTE DE GOUVERNE

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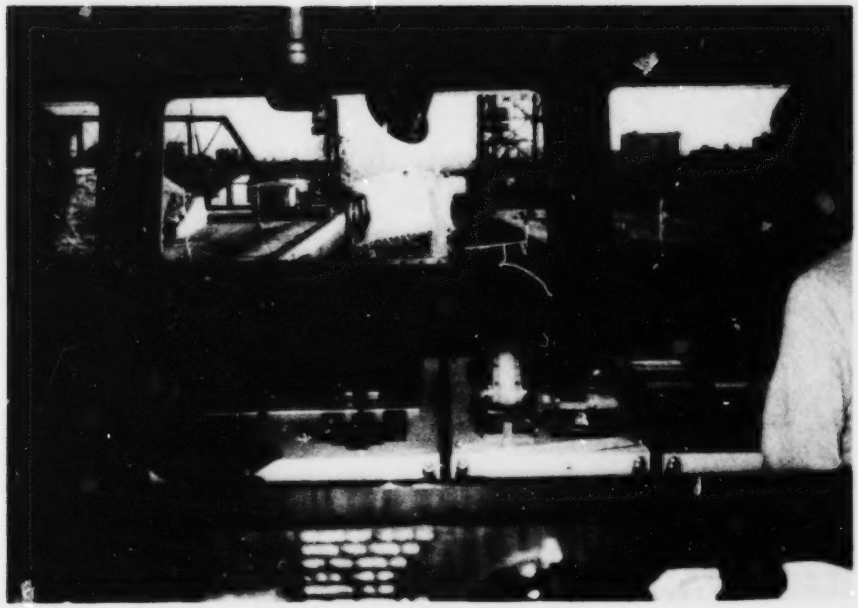
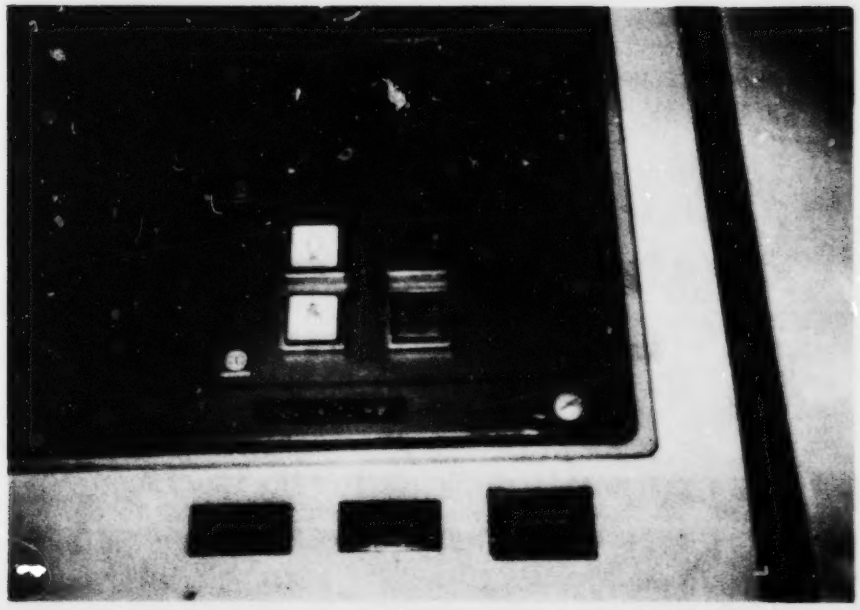


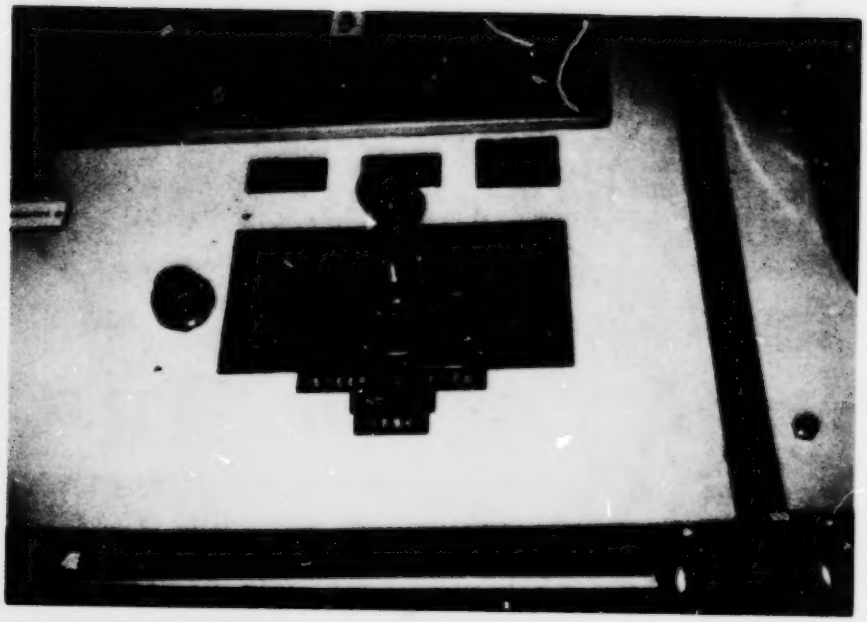
PRIMARY STEERING STATION
STEERING LEVER No. 1

POSTE DE BARRE PRINCIPAL
MANETTE DE GOUVERNE N°. 1



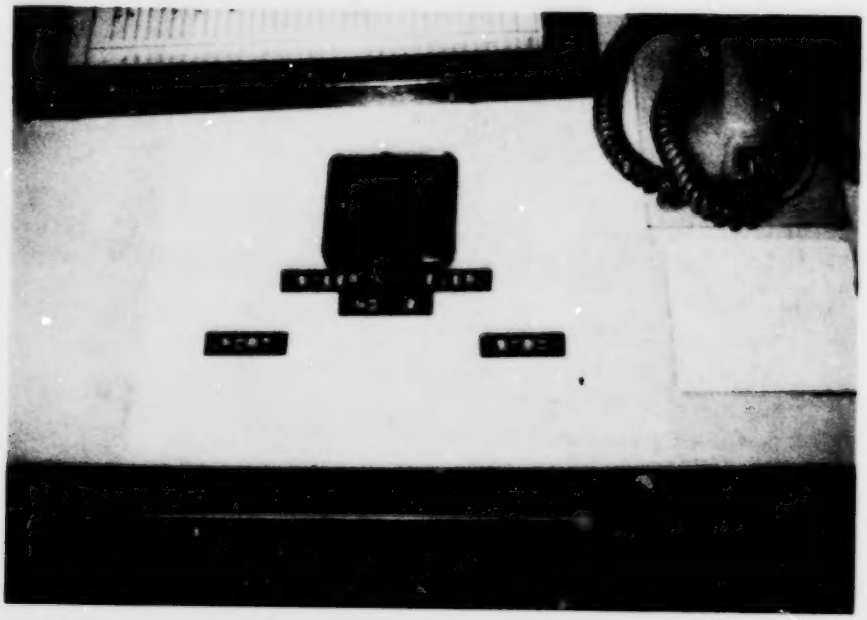
SWITCH FOR SELECTION OF STEERING LEVERS

COMMUTATEUR POUR LA SELECTION DE MANETTES DE GOUVERNE



STEERING LEVER No. 1

MANETTE DE GOUVERNE N°. 1



STEERING LEVER No. 2

MANETTE DE GOUVERNE N°. 2